

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 15 recites the limitation "the conductive agent" in line 7. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-7 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. (U.S. 2002/0124386) in view of Yoshino et al. (U.S. 5,631,100).

Regarding claim 1, Hosoya et al. discloses a non-aqueous electrolyte battery comprising:

- a positive electrode (see cathode, [0175])
- a negative electrode (see anode, [0176]), and
- a non-aqueous electrolyte (see electrolytic solution, [0174]),
- the positive electrode (see cathode, [0175]) having
 - a positive electrode active material-containing layer (see cathode coating film, [0175]) formed on a positive electrode current collector (see aluminum foil, [0175]) and containing
 - an olivine-type lithium phosphate as a positive electrode active material (see LiFePO₄, [0175]),
 - characterized in that the positive electrode current collector (see aluminum foil, [0175]) has a thickness of less than 20 µm (see 20 µm, [0175]), and

Hosoya et al. does not explicitly disclose:

- a surface of the positive electrode current collector that is in contact with the positive electrode active material-containing layer has a mean surface roughness Ra of greater than 0.026 μm .

Yoshino et al. discloses a non-aqueous electrolyte battery (Fig. 1) wherein a surface of the positive electrode current collector that is in contact with the positive electrode active material-containing layer has a mean surface roughness Ra of greater than 0.026 μm (C5/L26-32) to increase the adherence between the coating composition and the metallic foil and improve the high temperature characteristics of the secondary battery (C5/L26-32). Hosoya et al. and Yoshino et al. are analogous art because they are directed to non-aqueous electrolyte batteries. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the non-aqueous electrolyte battery of Hosoya et al. with the surface roughness of Yoshino et al. to increase the adherence between the coating composition and the metallic foil and improve the high temperature characteristics of the secondary battery.

Regarding the claim limitation that the positive electrode current collector has a thickness of less than 20 μm , a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Therefore, one skilled in the art would have expected a positive current collector of 20 μm to have the same properties as a positive current collector of less than 20 μm (i.e., 19 μm).

Regarding claim 2, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein the olivine-type lithium phosphate is lithium iron phosphate (see LiFePO₄, [0175]).

Regarding claims 3 and 4, modified Hosoya et al. discloses all claim limitations set forth above, but does not explicitly disclose a non-aqueous electrolyte battery:

- wherein the positive electrode current collector is an aluminum foil subjected to a roughened process and has a mean surface roughness Ra of less than 0.20 µm.

Yoshino et al. discloses a non-aqueous electrolyte battery (Fig. 1) wherein a surface of the positive electrode current collector that is in contact with the positive electrode active material-containing layer has a mean surface roughness Ra of greater than 0.1 µm to 0.9 µm (C5/L26-32) to increase the adherence between the coating composition and the metallic foil and improve the high temperature characteristics of the secondary battery (C5/L26-32). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected the overlapping portion of the ranges disclosed by the reference because selection of overlapping portion of ranges has been held to be a *prima facie* case of obviousness. *In re Malagari*, 182 USPQ 549.

Regarding limitations recited in claims 5 and 6, which are directed to method of making a roughened current collector it is noted that said limitations are not given patentable weight in the product claims. Even though a product-by-process is defined by the process steps by which the product is made, determination of patentability is based on the product itself and does not depend on its method of production. *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). Therefore, since the non-aqueous electrolyte battery as recited in claims 5 and 6 is the same as the non-aqueous electrolyte battery disclosed by modified Hosoya et al., as set forth above, the

claim is unpatentable even though the non-aqueous electrolyte battery of modified Hosoya et al. was made by a different process. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Regarding claim 7, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein the lithium iron phosphate has an average particle size of 10 μm or less (see 3.1 μm , [0055]).

Regarding claim 13, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein carbon is superficially coated on, or adhered to, the positive electrode active material particles (see LiFePO₄ carbon composite material, [0044]).

Regarding claim 14, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein a portion of lithium sites in the positive electrode active material is substituted by a transition metal (see LiFePO₄, abstract).

7. Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. (U.S. 2002/0124386) in view of Yoshino et al. (U.S. 5,631,100) as applied to claim 1 above, and further in view of Johnson et al. (U.S. 5,601,951).

Regarding claims 8-10, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein the positive electrode active material-containing layer (see cathode coating film, [0175]) contains a conductive agent (see acetylene black, [0175]),
- the conductive agent has a BET specific surface area of 15 m²/g or greater (see acetylene black, [0175]), and
- the positive electrode active material-containing layer has a filling density of 1.7 g/cm³ or greater (see press density, Table A-3).

Regarding the claim limitations that the conductive agent has a BET specific surface area of 15 m²/g or greater, Hosoya et al. does not explicitly disclose the BET specific surface area of acetylene black. Johnson et al. discloses that acetylene black has a BET specific surface area of between 60 and 70 m²/g (C1/L18-35). Therefore, the conductive agent of Hosoya et al. (see acetylene black, [0175]) inherently possesses a BET specific surface area of 15 m²/g or greater as evidenced by Johnson et al.

Regarding claim 11 and 12, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein the positive electrode active material-containing layer has a filling density of 3.15 g/cm³ or less (see press density, Table A-3).

8. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. (U.S. 2002/0124386) in view of Johnson et al. (U.S. 5,601,951).

Regarding claim 15, Hosoya et al. discloses a non-aqueous electrolyte battery comprising:

- a positive electrode (see cathode, [0175])

- a negative electrode (see anode, [0176]), and
- a non-aqueous electrolyte (see electrolytic solution, [0174]),
- the positive electrode (see cathode, [0175]) having
 - a positive electrode active material-containing layer (see cathode coating film, [0175]) formed on a positive electrode current collector (see aluminum foil, [0175]) and contains
 - an olivine-type lithium phosphate as a positive electrode active material (see LiFePO₄, [0175]),
- the negative electrode (see anode, [0176]) containing
 - a negative electrode (see graphite powders, [0176]) capable of intercalating and deintercalating lithium (see graphite, [0176])
- characterized in that the conductive agent has a BET specific surface area of 15 m²/g or greater (see acetylene black, [0175]), and
- the positive electrode active material-containing layer has a filling density of 1.7 g/cm³ or greater (see press density, Table A-3).

Regarding the claim limitations that the conductive agent has a BET specific surface area of 15 m²/g or greater, Hosoya et al. does not explicitly disclose the BET specific surface area of acetylene black. Johnson et al. discloses that acetylene black has a BET specific surface area of between 60 and 70 m²/g (C1/L18-35). Therefore, the conductive agent of Hosoya et al. (see acetylene black, [0175]) inherently possesses a BET specific surface area of 15 m²/g or greater as evidenced by Johnson et al.

Regarding claim 16, Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery comprising:

- wherein the olivine-type lithium phosphate is lithium iron phosphate (see LiFePO_4 , [0175]).

Regarding claims 17 and 18, Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery comprising:

- wherein the positive electrode active material-containing layer has a filling density of 3.15 g/cm^3 or less (see press density, Table A-3).

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Cullen whose telephone number is 571-270-1251. The examiner can normally be reached on Monday thru Thursday 6:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on 571-272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. P. C./
Examiner, Art Unit 1795

/Robert Hodge/
Primary Examiner, Art Unit 1795